UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/830,177	04/21/2004	Scott B. Wilson	PERDC.001C1CP1	7719

20995 7590 10/11/2007

KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER	
COUGHLAN, PETER D	

ART UNIT	PAPER NUMBER
2129	

NOTIFICATION DATE	DELIVERY MODE
10/11/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
eOAPilot@kmob.com

Office Action Summary	Application No. 10/830,177	Applicant(s) WILSON, SCOTT B.	
	Examiner Peter Coughlan	Art Unit 2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 27 July 2007.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-25,31,33,37-39 and 82-104 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) 1-25,31,33,37-39 and 82-104 is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on 4/21/2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. This office action is in response to an AMENDMENT entered July 27, 2007 for the patent application 10/830177 filed on April 21, 2004.

2. All previous office actions are fully incorporated into this Non-Final Office Action by reference.

Status of Claims

3. Claims 1-25, 31, 33, 37-39, 82-104 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 31, 33, 37, 39, 82, 85, 87-89, 93, 99-104 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias ('Personal computer system for ECG recognition in myocardial infarction diagnosing based on an artificial neural network'; referred to as **Elias)**, in view of Magnuson. (U. S. Patent Publication 20050236004, referred to as **Magnuson**)

Claim 1

Elias teaches collecting at least one training cases in the medical instrument, wherein the training case has an input state indicative of at least a portion of a first biomedical signal of a particular patient and a corresponding output value indicative of a medical event of the particular patient. (**Elias,** abstract; 'Training cases' of applicant is equivalent to 'q, r, s, p, t, age and sex' measurements of patient.)

Elias does not teach reconfiguring a neural network stored in the medical instrument based on the at least one training case of a particular patient.

Magnuson teaches reconfiguring a neural network stored in the medical instrument based on the at least one training case of a particular patient. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM I)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by having patient specific tools as taught by

Magnuson to reconfiguring a neural network stored in the medical instrument based on the at least one training case of a particular patient.

For the purpose of accounting the differences between patents for improved results.

Elias teaches receiving a second biomedical signal of the particular patient in the medical instrument (**Elias,** p1096, C2:3-16, Figure 2; In order to get 'results' the neural network must receive a second 'biomedical signal.'); applying the second biomedical signal to the generated neural network to generate an output of the neural network(**Elias,** p1096, C2:3-16, Figure 2; In order to get 'results' the neural network must be 'applied' with a second 'biomedical signal.'); and identifying a medical event of the particular patient based the output of the neural network. (**Elias,** abstract; 'Identifying a medical event' of applicant is illustrated by each output nodes of the neural network. These nodes represent 'normal, left ventricular hypertrophy, right ventricular hypertrophy, biventricular hypertrophy, anterior myocardial infarction, inferior myocardial infarction.)

Elias does not teach outputting data indicative of the identified medical event of the particular patient.

Magnuson teaches outputting data indicative of the identified medical event of the particular patient. (**Magnuson,** ¶0044, ¶0035, ¶0004, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Identified medical event' of applicant is equivalent to 'detecting such things such as cancer or heart problems' of Magnuson.) It would have been obvious to a person having ordinary skill in

the art at the time of applicant's invention to modify the teachings of Elias by outputting the results as taught by Magnuson to outputting data indicative of the identified medical event of the particular patient.

For the purpose of being able to see the results from the invention.

Claim 2

Elias teaches selecting a plurality of time epochs from a record of instrument feature values (**Elias,** abstract; 'Plurality of time epochs' of applicant is equivalent to time and amplitudes' of Elias.); and indicating an output value for each selected time epoch. (**Elias,** abstract; 'Indicating an output value' of applicant is equivalent to the value of the 'amplitude' of Elias.)

Claim 31

Elias teaches applying the neural network in an electronic device to generate a first output value indicative of a classification a first input state (**Elias,** abstract, p1096, C1:23 through C2:2; 'Classification a first input state' of applicant is equivalent to 'training' of a neural network. The training data for the neural network are the p, q, r, s, t, st segment, age and sex of the patient.); detecting a first prediction error in the first output value (**Elias,** Figure 2; To use a back propagation neural network, an error needs to be detected between the projected output and the actual output of the neural network. This corresponds to the 'first output value' of applicant.); creating a first training case based on the first input state wherein the first training case corrects the first

prediction error. (**Elias,** abstract, p1096, C1:23 through C2:2; 'Training cases' of applicant is equivalent to 'q, r, s, p, t, age and sex' measurements of patient. 'Corrects' is accomplished by using a 'back propagation neural network' of Elias.)

Elias does not teach reconfiguring the neural network to correctly classify the first training case without retraining the neural network wherein reconfiguring the detection module further comprises adding a first pattern layer node to the neural network based on the first training case.

Magnuson teaches reconfiguring the neural network to correctly classify the first training case without retraining the neural network wherein reconfiguring the detection module further comprises adding a first pattern layer node to the neural network based on the first training case. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM I)' on a 'non-linear model' of Magnuson. 'Adding a first pattern layer' of applicant is equivalent to inserting one of the 'first pattern model (FPM i)' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by using a weights matrix as taught by Magnuson to reconfiguring the neural network to correctly classify the first training case without retraining the neural network wherein reconfiguring the detection module further comprises adding a first pattern layer node to the neural network based on the first training case.

For the purpose of avoiding retraining a neural network.

Elias teaches and applying the neural network to generate a second output value from the electronic device indicative of a classification of a second input state. (**Elias,** p1096, C2:3-16, Figure 2; In order to get 'results' the neural network must be 'applied' with a second 'input state.')

Elias does not teach outputting data indicative of the second output value.

Magnuson teaches outputting data indicative of the second output value. (**Magnuson,** ¶0004; 'Outputting data indicative of the second output value' of applicant is equivalent to 'detecting such things such as cancer or heart problems' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by outputting a result as taught by Magnuson to outputting data indicative of the second output value.

For the purpose of receiving a patient specific diagnosis.

Claim 33

Elias teaches wherein the neural network is initially incapable of correctly classifying a first input state. (**Elias,** abstract, p1096, C1:23 through C2:2; When training a neural network (with first input state) it is obvious that it is incapable to classify due to the fact the neural network is in a training state and not a classifying state.)

Claim 37

Elias teaches applying a detection module to classify the first input state into a first event class (**Elias,** abstract, p1096 C1:23 through C2:16, p1095; 'Applying a

detection module to classify the first input state into a first event class' means the training of the neural network for the first event or medical condition. This is equivalent to 'the training process' of Elias.); determining that the detection module incorrectly classified the first input state into the first event class (**Elias,** abstract, p1096 C1:23 through C2:16, p1095;.' Determining that the detection module incorrectly classified the first input state into the first event class' is part of the back propagation process in which the difference between the incorrectly classification and the ideal classification is used to modify the weights of the neural network.); creating the first training case by associating the first input state with a second event class (**Elias,** abstract, p1096 C1:23 through C2:16, p1095;.The 'association' of applicant is equivalent to the relationship between the real output of the node compared to the ideal output of the node.); and reconfiguring the detection module in real-time based on the first training case. (**Elias,** abstract, p1096 C1:23 through C2:16, p1095; 'Reconfiguring' of applicant is equivalent to the adjustment of the weights due to back propagation of the neural network. 'Real time' of applicant is equivalent to 'real time to evaluate' of Elias.)

Claim 39

Elias teaches wherein the first and second input states are indicative of a biomedical signal of at least one patient and wherein the first and second output values are indicative of a medical condition.(**Elias,** abstract; Both the training and the use of Elias pertain to myocardial infarction which is a medical condition.)

Claim 82

Elias teaches receiving a biomedical signal of a particular patient(**Elias,** abstract, p1096, C1:23 through C2:2; 'Receiving a biomedical signal' of applicant is equivalent to 'q, r, s, p, t, age and sex' measurements of the patient of Elias.); identifying a portion of the signal that is indicative of a medical event of the particular patient based on user input. (**Elias,** abstract, p1096, C1:23 through C2:2; 'Identifying a portion' of applicant are given by the examples 'q, r, s, p, t, age and sex' measurements of the patient of Elias.)

Elias does not teach reconfiguring a predictive model stored in a memory of an electronic device for identifying a subsequent medical event of the particular patient based on an additional biomedical signal of the patient and; storing the reconfigured predictive model in the memory of the electronic device.

Magnuson teaches reconfiguring a predictive model stored in a memory of an electronic device for identifying a subsequent medical event of the particular patient based on an additional biomedical signal of the patient (**Magnuson,** ¶0044, ¶0035, ¶0004, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM i)' on a 'non-linear model' of Magnuson. 'Particular patient' of applicant s equivalent to 'individual specifically' of Magnuson. 'Identified medical event' of applicant is equivalent to 'detecting such things such as cancer or heart problems' of Magnuson.) and; storing the reconfigured predictive model in the memory of the electronic device. (**Magnuson,** ¶0044, ¶0035, Figure 8; The storage of the predictive model in memory' of

applicant is lustrated by each 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by being able to reconfigure a neural network as taught by Magnuson to have reconfiguring a predictive model stored in a memory of an electronic device for identifying a subsequent medical event of the particular patient based on an additional biomedical signal of the patient and; storing the reconfigured predictive model in the memory of the electronic device.

For the purpose of obtaining an increased diagnoses due to the fact the neural network is patient specific.

Claim 85

Elias teaches wherein generating the predictive model comprises reconfiguring a neural network. (**Elias,** abstract, Elias discloses the use of an artificial neural network for patient specific purposes. Therefore the network must be trained for said specific person.)

Claim 87

Elias teaches wherein identifying the portion of the signal comprises identifying an instrument feature of the signal. (**Elias,** abstract, p1096, C1:23 through C2:2; Examples of 'feature of the signal' of applicant are disclosed by the 'q, r, s, p, t' waves of the patient ECG measurements of patient.)

Claim 88

Elias teaches applying a second biomedical signal of the patient to the generated model to generate an output of the model (**Elias,** abstract, Figure 2, p1096, C1:23 through C2:2; The second biomedical signal of applicant is equivalent to the ECG signal of Elias. 'Applying' the signal is simply inserting the information into the neural network.); and identifying the medical event of the patient based on the output of the model. (**Elias,** abstract, 'Identifying a condition', of applicant is illustrated by each output nodes of the neural network. These nodes represent 'normal, left ventricular hypertrophy, right ventricular hypertrophy, biventricular hypertrophy, anterior myocardial infarction, inferior myocardial infarction.)

Claim 89

Elias teaches a memory configured to store a neural network and at least one training case, wherein the training case has an input state indicative of at least a portion of a first biomedical signal of a particular patient and a corresponding output value indicative of a medical event of the particular patient. (**Elias,** figure 2, abstract; 'Memory configured to store' of applicant is equivalent to the weights in each node of the neural network. The 'first biomedical signal' of applicant is equivalent to the 'signal pre-processing' of Elias. 'Medical event' of applicant is equivalent to 'myocardial infarction' of Elias.)

Elias does not teach a processor configured to: reconfigure the stored neural network based on the at least one training case of a particular patient; receive a

second biomedical signal of the particular patient; apply the second biomedical signal to the reconfigured neural network to generate an output of the neural network.

Magnuson teaches a processor configured to: reconfigure the stored neural network based on the at least one training case of a particular patient; receive a second biomedical signal of the particular patient (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.); apply the second biomedical signal to the reconfigured neural network to generate an output of the neural network. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Apply the second biomedical signal' of applicant is equivalent to applying a different 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by being able to reconfigure a neural to a patient specific format as taught by Magnuson to have a processor configured to: reconfigure the stored neural network based on the at least one training case of a particular patient; receive a second biomedical signal of the particular patient; apply the second biomedical signal to the reconfigured neural network to generate an output of the neural network.

For the purpose of avoiding retraining a neural network to a specific patient.

Elias teaches identify a medical event of the particular patient based the output of the neural network. (**Elias,** p1096, C2:3-16, Figure 2, abstract; 'Output' of applicant

occurs at the 'output layer' of the neural network. Each node represents a medical event corresponding to myocardial infarction.)

Elias does not teach an output device configured to output data indicative of the identified medical event of the particular patient.

Magnuson teaches an output device configured to output data indicative of the identified medical event of the particular patient. (**Magnuson,** ¶0044, ¶0004; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Identified medical event' of applicant is equivalent to 'detecting such things such as cancer or heart problems' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by outputting results as taught by Magnuson to have an output device configured to output data indicative of the identified medical event of the particular patient.

For the purpose of getting the results of the inventions computations.

Claim 93

Elias teaches means for storing a neural network and at least one training case, wherein the training case has an input state indicative of at least a portion of a first biomedical signal of a particular patient and a corresponding output value indicative of a medical event of the particular patient. (**Elias,** figure 2, abstract; 'Means for storing a neural network' of applicant is equivalent to the weights in each node of the neural network. 'Training case has an input state indicative of at least a portion of a first

biomedical signal' of applicant is illustrated by the use of a back propagation neural network of Elias. The 'first biomedical signal' of applicant is equivalent to the 'signal pre-processing' of Elias. 'Medical condition' of applicant is equivalent to 'myocardial infarction' of Elias.)

Elias does not teach means for processing, said processing means configured to: reconfigure the stored neural network based on at least one training case of a particular patient; and receive a second biomedical signal of the particular patient; apply the second biomedical signal to the generated neural network to generate an output of the neural network.

Magnuson teaches means for processing, said processing means configured to: reconfigure the stored neural network based on at least one training case of a particular patient (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.); and receive a second biomedical signal of the particular patient (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Receive a second biomedical signal' of applicant is equivalent to 'intestinal discomfort' of Magnuson (the first would be migraine headache).); apply the second biomedical signal to the generated neural network to generate an output of the neural network. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Apply the second biomedical signal' of applicant is equivalent to applying a different 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's

invention to modify the teachings of Elias by being able to reconfigure a neural network as taught by Magnuson to have means for processing, said processing means configured to: reconfigure the stored neural network based on at least one training case of a particular patient; and receive a second biomedical signal of the particular patient; apply the second biomedical signal to the generated neural network to generate an output of the neural network.

For the purpose of avoiding the cost of retraining a neural network.

Elias teaches identify a medical event of the particular patient based the output of the neural network. (**Elias,** p1096, C2:3-16, Figure 2, abstract; 'Output' of applicant occurs at the 'output layer' of the neural network. Each node represents a medical event corresponding to myocardial infarction.)

Elias does not teach means for outputting data indicative of the identified medical event of the particular patient.

Magnuson teaches means for outputting data indicative of the identified medical event of the particular patient. (**Magnuson,** ¶0044, ¶0004; 'Particular patient' of applicant s equivalent to 'individual specifically' of Magnuson. 'Identified medical event' of applicant is equivalent to 'detecting such things such as cancer or heart problems' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by outputting the results as taught by Magnuson to have means for outputting data indicative of the identified medical event of the particular patient.

For the purpose of linking a medical event to inputted data.

Claim 99

Elias teaches collecting at least one training case in a medical instrument, wherein the training case has an input state indicative of at least a portion of a first biomedical signal of a particular patient and a corresponding output value indicative of a medical event of the particular patient. (**Elias,** figure 2, abstract; 'Means for storing a neural network' of applicant is equivalent to the weights in each node of the neural network. 'Training case has an input state indicative of at least a portion of a first biomedical signal' of applicant is illustrated by the use of a back propagation neural network of Elias. The 'first biomedical signal' of applicant is equivalent to the 'signal pre-processing' of Elias. 'Medical condition' of applicant is equivalent to 'myocardial infarction' of Elias.)

Elias does not teach reconfiguring a neural network stored in the medical instrument based on the at least one training case of the particular patient; receiving a second biomedical signal of the particular patient in the medical instrument; applying the second biomedical signal to the generated neural network to generate an output of the neural network.

Magnuson teaches reconfiguring a neural network stored in the medical instrument based on the at least one training case of the particular patient (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.);

receiving a second biomedical signal of the particular patient in the medical instrument (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Receive a second biomedical signal' of applicant is equivalent to 'intestinal discomfort' of Magnuson (the first would be migraine headache).); applying the second biomedical signal to the generated neural network to generate an output of the neural network. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Apply the second biomedical signal' of applicant is equivalent to applying a different 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by being able to reconfigure a neural network as taught by Magnuson to have reconfiguring a neural network stored in the medical instrument based on the at least one training case of the particular patient; receiving a second biomedical signal of the particular patient in the medical instrument; applying the second biomedical signal to the generated neural network to generate an output of the neural network.

For the purpose of avoiding the costs or retraining a neural network.

Elias teaches identifying a medical event of the particular patient based the output of the neural network. (**Elias,** abstract; 'Identifying a medical event' of applicant is illustrated by each output nodes of the neural network. These nodes represent 'normal, left ventricular hypertrophy, right ventricular hypertrophy, biventricular hypertrophy, anterior myocardial infarction, inferior myocardial infarction.)

Elias does not teach outputting data indicative of the identified medical event of the particular patient.

Magnuson teaches outputting data indicative of the identified medical event of the particular patient. (**Magnuson,** ¶0044, ¶0004; 'Particular patient' of applicant s equivalent to 'individual specifically' of Magnuson. 'Identified medical event' of applicant is equivalent to 'detecting such things such as cancer or heart problems' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by producing an output as taught by Magnuson to have outputting data indicative of the identified medical event of the particular patient.

For the purpose of having the invention correlate a medical event to inputted data.

Claim 100

Elias does not teach wherein reconfiguring the neural network comprises adding a first pattern layer node to the neural network based on the at least one training case.

Magnuson teaches wherein reconfiguring the neural network comprises adding a first pattern layer node to the neural network based on the at least one training case. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Reconfiguring a neural network' of applicant is equivalent to applying a 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by being able to reconfigure a neural network as taught by Magnuson to have wherein reconfiguring the

neural network comprises adding a first pattern layer node to the neural network based on the at least one training case.

For the purpose of avoiding additional cost of retraining a neural network.

Claim 101

Elias does not teach wherein reconfiguring the predictive model comprises adding a first pattern layer node to a neural network based on the additional biomedical signal of the patient.

Magnuson teaches wherein reconfiguring the predictive model comprises adding a first pattern layer node to a neural network based on the additional biomedical signal of the patient. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Reconfiguring a predictive model' of applicant is equivalent to applying a 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by being able to reconfigure a neural network as taught by Magnuson to have wherein reconfiguring the predictive model comprises adding a first pattern layer node to a neural network based on the additional biomedical signal of the patient.

For the purpose of obtaining results with improved accuracy due to the fact the neural network is patient specific.

Claim 102

Elias does not teach wherein the processor is configured to reconfigure the neural network by adding a first pattern layer node to the neural network based on the at least one training case.

Magnuson teaches wherein the processor is configured to reconfigure the neural network by adding a first pattern layer node to the neural network based on the at least one training case. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Reconfiguring a neural network' of applicant is equivalent to applying a 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by being able to reconfigure a neural network as taught by Magnuson to have wherein the processor is configured to reconfigure the neural network by adding a first pattern layer node to the neural network based on the at least one training case.

For the purpose of avoiding additional cost of retraining a neural network.

Claim 103

Elias does not teach wherein the processing means is configured to reconfigure the neural network by adding a first pattern layer node to the neural network based on the at least one training case.

Magnuson teaches wherein the processing means is configured to reconfigure the neural network by adding a first pattern layer node to the neural network based on the at least one training case. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Reconfiguring a neural network' of applicant is equivalent to applying a 'first principle model (FPM i)' on

a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by being able to reconfigure a neural network as taught by Magnuson to have wherein the processing means is configured to reconfigure the neural network by adding a first pattern layer node to the neural network based on the at least one training case.

For the purpose of obtaining results with improved accuracy due to the fact the neural network is patient specific.

Claim 104

Elias does not teach wherein reconfiguring the neural network comprises adding a first pattern layer node to the neural network based on the at least one training case.

Magnuson teaches wherein reconfiguring the neural network comprises adding a first pattern layer node to the neural network based on the at least one training case. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Reconfiguring a neural network' of applicant is equivalent to applying a 'first principle model (FPM i)' on a 'non-linear model' of Magnuson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias by being able to reconfigure a neural network as taught by Magnuson to have wherein reconfiguring the neural network comprises adding a first pattern layer node to the neural network based on the at least one training case.

For the purpose of avoiding additional cost of retraining a neural network and obtaining results with improved accuracy due to the fact the neural network is patient specific.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 38, 83, 84, 86, 90-92, 94-98 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias and Magnuson as set forth above, in view of Jordan. (U. S. Patent Publication 20040077967, referred to as **Jordan**)

Claims 38, 92, 96

Elias and Magnuson do not teach wherein the output device comprises a display.

Jordan teaches wherein the output device comprises a display. (**Jordan,** abstract; 'Display' of applicant is equivalent to 'display device' of Jordan.) It would have

been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by using a display as a output device as taught by Jordan to have wherein the output device comprises a display.

For the purpose of viewing the results.

Claims 83, 90, 94, 97

Elias and Magnuson do not teach wherein the biomedical signal comprises an electroencephalogram.

Jordan teaches wherein the biomedical signal comprises an electro-encephalogram. (**Jordan,** ¶0001, ¶0011, ¶0013) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by using brain waves as taught by Jordan to have wherein the biomedical signal comprises an electroencephalogram.

For the purpose of either establishing a baseline reading or reading a current reading compared to a base line reading to detect differences brain damage.

Claims 84, 91, 95, 98

Elias and Magnuson do not teach wherein the medical event of the patient comprises a seizure.

Jordan teaches wherein the medical event of the patient comprises a seizure. (**Jordan,** ¶0001, ¶0011, ¶0013) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and

Magnuson by looking for seizure characteristics as taught by Jordan to wherein the medical condition of the patient comprises a seizure.

For the purpose of determining or ruling out the condition of seizures.

Claim 86

Elias and Magnuson do not teach at least partially displaying the signal; and displaying at least one user control for selecting the identified portion of the signal.

Jordan teaches displaying at least one user control for selecting the identified portion of the signal.(**Jordan,** ¶0012) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias and Magnuson by outputting part of the signal as taught by Jordan to have at least partially displaying the signal; and displaying at least one user control for selecting the identified portion of the signal.

For the purpose of allowing the user to see the actual signal which is used for input for verification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the

> subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3-6, 8-10, 13, 14, 17, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias and Magnuson as set forth above, in view of Katz. (U. S. Patent 5943661, referred to as **Katz**)

Claim 3

Elias and Magnuson do not teach selecting a configuration of instrument features; and wherein the constructing the neural network based on the training cases comprises: defining the neural network topology based on the input values and output values of the plurality of training cases; and determining a kernel width value.

Katz teaches selecting a configuration of instrument features; and wherein the constructing the neural network based on the training cases comprises (**Katz,** C3:45-61; 'Instrument features' of applicant is equivalent to selected data points' of Katz.): defining the neural network topology based on the input values and output values of the plurality of training cases (**Katz,** C2:66 through C3:2; Defining the 'topology' of the neural network of applicant is equivalent to 'transformation into the neural network' of Katz.); and determining a kernel width value. (**Katz,** C3:62 through C4:7; 'Determination of the kernel width is performed by the kernel function of Katz.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by using a neural network as taught by Katz to

selecting a configuration of instrument features; and wherein the constructing the neural network based on the training cases comprises: defining the neural network topology based on the input values and output values of the plurality of training cases; and determining a kernel width value.

For the purpose of taking advantage of the neural network excellent property of classification.

Claim 4

Elias and Magnuson do not teach training the neural network includes determining an optimal kernel width value by minimizing prediction error of the neural network.

Katz teaches training the neural network includes determining an optimal kernel width value by minimizing prediction error of the neural network. (**Katz,** C4:18-22; Applicant uses Parzen's method for population density and Katz uses Parzen's method for determining population density.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by finding the optimal kernel value as taught by Katz to train the neural network includes determining an optimal kernel width value by minimizing prediction error of the neural network.

For the purpose of finding population density.

Claim 5

Elias and Magnuson do not teach determining an optimal input feature kernel width value for each input feature based on the determined optimal kernel width value.

Katz teaches determining an optimal input feature kernel width value for each input feature based on the determined optimal kernel width value. (**Katz,** C4:18-22; The function of Katz is the function of 'x' with respect to sigma. Sigma is based on Sigma.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by finding the optimal input value for the kernel as taught by Katz to determine an optimal input feature kernel width value for each input feature based on the determined optimal kernel width value.

For the purpose of using this value to use for finding the kernel width.

Claim 6

Elias and Magnuson do not teach the neural network is a probabilistic neural network.

Katz teaches the neural network is a probabilistic neural network. (**Katz,** C2:12-23) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by using a probabilistic neural network design as taught by Katz to have the neural network is a probabilistic neural network.

For the purpose of determining an answer with an probability of accuracy associated with it.

Claim 8

Elias and Magnuson do not teach determining the kernel width value is based on a population statistic of the plurality of training cases.

Katz teaches determining the kernel width value is based on a population statistic of the plurality of training cases. (**Katz,** C4:18-22; Katz illustrates as population grows, kernel width decreases, thus it is based upon population statistics.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by finding the kernel width as taught by Katz to determine the kernel width value is based on a population statistic of the plurality of training cases.

For the purpose of find the kernel width based on population statistic or population density.

Claim 9

Elias and Magnuson do not teach determining the kernel width value is based at least in part on the mathematical term of the number of training cases raised to an exponent power of about negative one-fifth.

Katz teaches determining the kernel width value is based at least in part on the mathematical term of the number of training cases raised to an exponent power of about negative one-fifth. (**Katz,** C3:62 through C4:22; 'About negative 1/5' is close enough to 'negative ½' of Katz.) It would have been obvious to a person having ordinary skill

skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by using training cases in the denominator as a root n root function as taught by Katz to the kernel width value is based at least in part on the mathematical term of the number of training cases raised to an exponent power of about negative one-fifth.

For the purpose of allowing the width to grow exponentially based of training cases

Claim 10

Elias and Magnuson do not teach determining the kernel width value is based on the population distribution of the plurality of training cases.

Katz teaches determining the kernel width value is based on the population distribution of the plurality of training cases. (**Katz,** C4:18-22; Katz illustrates as population grows, kernel width decreases, thus it is based upon population statistics. This would be the same in a functioning neural network as it would be in a training neural network.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by determining kernel width as taught by Katz to have the kernel width value is based on the population distribution of the plurality of training cases.

For the purpose of using population distribution or population density as a basis of finding the kernel width.

Claim 13

Elias and Magnuson do not teach normalizing the input values of the plurality of training cases based on the standard deviation for each input feature.

Katz teaches normalizing the input values of the plurality of training cases based on the standard deviation for each input feature. (**Katz,** C4:18-22; The 'standard deviation' of each input node can be used to normalized the training data of applicant is illustrated by the generation of the value of sigma which is one standard deviation of Katz.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by using standard deviation as a base for normalizing input values as taught by Katz to normalize the input values of the plurality of training cases based on the standard deviation for each input feature.

For the purpose of using the Gaussian distribution as a bases for input values.

Claim 14

Elias and Magnuson do not teach determining a plurality of partitions based on the pattern layer nodes of the neural network wherein each partition comprises a plurality of groups of pattern layer nodes; selecting one of the plurality of partitions based on a partition metric; and for each group of pattern layer nodes within the selected partition: replacing the group of pattern layer nodes with a compressed pattern layer node; and adjusting the link weights between the compressed pattern layer node and any summation layer nodes to reflect the number of replaced pattern layer nodes.

Katz teaches determining a plurality of partitions based on the pattern layer nodes of the neural network wherein each partition comprises a plurality of groups of pattern layer nodes (**Katz,** C1:41-58; 'Determining a plurality of partitions' of applicant is equivalent to 'classification' of Katz.); selecting one of the plurality of partitions based on a partition metric (**Katz,** C8:42-61; 'Partition metric' of applicant is equivalent to 'weights' of Katz.); and for each group of pattern layer nodes within the selected partition (**Katz,** Fig. 4; Katz illustrates that a group of nodes in layer 'L' corresponds to a node in layer 'M'. This group on nodes in layer 'L' is equivalent to a 'group of pattern layer nodes' of applicant.): replacing the group of pattern layer nodes with a compressed pattern layer node (**Katz,** C2:66 through C3:2; 'Compressed pattern layer node' of applicant is accomplished by 'data compression scheme' of Katz.); and adjusting the link weights between the compressed pattern layer node and any summation layer nodes to reflect the number of replaced pattern layer nodes. (**Katz,** C2:12-23; By training, weights are adjusted so that output nodes reflect input pattern layer nodes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by finding partitions for the neural network as taught by Katz to determine a plurality of partitions based on the pattern layer nodes of the neural network wherein each partition comprises a plurality of groups of pattern layer nodes; selecting one of the plurality of partitions based on a partition metric; and for each group of pattern layer nodes within the selected partition; replacing the group of pattern layer nodes with a compressed pattern layer node; and adjusting the link

weights between the compressed pattern layer node and any summation layer nodes to reflect the number of replaced pattern layer nodes.

For the purpose of aiding in the accuracy of the neural network.

Claim 17

Elias and Magnuson do not teach the partition metric comprises determining an error value for each partition.

Katz teaches the partition metric comprises determining an error value for each partition. (**Katz,** C9:23 through C10:12; 'Error value' of applicant is equivalent to 'error bars' of Katz.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias and Magnuson by finding the error value for each partition as taught by Katz to have the partition metric comprises determining an error value for each partition.

For the purpose of generating an accuracy level with every classification result.

Claim 18

Elias and Magnuson do not teach the partition metric comprises determining a compression ratio for each partition.

Katz teaches the partition metric comprises determining a compression ratio for each partition. (**Katz,** C2:44-56; 'Compression ratio' of applicant is equivalent to 'compression procedures' of Katz.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of

Elias and Magnuson by teaching within each partition, determine the compression ration as taught by Katz to have the partition metric comprises determining a compression ratio for each partition.

For the purpose of in an attempt to balance the compression versus loss of accuracy.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias, Magnuson and Katz as set forth above, in view of Wasserman. (U. S. Patent 5559929, referred to as **Wasserman**)

Claim 7

Elias, Magnuson and Katz do not teach the neural network is a generalized regression neural network.

Wasserman teaches the neural network is a generalized regression neural network.(**Wasserman,** C9:60 through C10:3) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson and Katz by using a regression neural network as taught by Wasserman to have the neural network to be a generalized regression neural network.

For the purpose of allowing training on new data without requiring previous data to be available.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias and Katz as set forth above, in view of Oriol. (U. S. Patent Publication 20010014776, referred to as **Oriol**)

Claim 11

Elias, Magnuson and Katz do not teach the population distribution of the plurality of training cases is approximately Normal.

Oriol teaches the population distribution of the plurality of training cases is approximately Normal. (**Oriol,** ¶0086; 'Normal population distribution' of applicant is equivalent to 'Gaussian windows' of Oriol.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson and Katz by using normal distributions as taught by Oriol to have the population distribution of the plurality of training cases that is approximately Normal.

For the purpose of approximating sigma in a standard distribution.

Claim 12

Elias and Magnuson does not teach normalizing the input values of the plurality of training cases based on the standard deviation for each input feature.

Katz teaches normalizing the input values of the plurality of training cases based on the standard deviation for each input feature. (**Katz,** C4:18-22; The 'standard deviation' of each input node can be used to normalized the training data of applicant is illustrated by the generation of the value of sigma which is one standard deviation of Katz.)

Elias, Magnuson and Katz do not teach the step of determining the kernel width value comprises defining the kernel width value to be a number in the range 0.1 to 1.0.

Oriol teaches the step of determining the kernel width value comprises defining the kernel width value to be a number in the range 0.1 to 1.0. (**Oriol,** ¶0006; 'Kernel width value' of applicant is equivalent to 'range' of Oriol.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson and Katz by using sigma as taught by Oriol to have normalizing the input values of the plurality of training cases based on the standard deviation for each input feature, and wherein determining the kernel width value comprises defining the kernel width value to be a number in the range 0.1 to 1.0.

For the purpose of using the same scale for all input parameters thus balancing variables from different domains.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 15, 16, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias and Katz as set forth above, in view of Straforini. (U. S. Patent 6092059, referred to as **Straforini**)

Claim 15

Elias, Magnuson and Katz do not teach the partition metric comprises determining a BIC value for each partition.

Straforini teaches the partition metric comprises determining a BIC value for each partition. (**Straforini,** C17:23-35; 'BIC value' of applicant is equivalent to 'bayes based configuration' of Straforini.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson and Katz by using a BIC value as taught by Straforini to have the partition metric comprises determining a BIC value for each partition.

For the purpose of using Bayesian Information Criterion is used to determine which instrument configuration is the most optimal.

Claim 16

Elias, Magnuson and Katz do not teach the partition metric comprises selecting the maximum BIC value.

Straforini teaches the partition metric comprises selecting the maximum BIC value. (**Straforini,** C17:64 through C18:15; 'Maximum BIC value' of applicant is equivalent to 'first feature in the list is that with the highest rank' of Straforini.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson and Katz by choosing

the maximum as taught by Straforini to have the partition metric comprised by selecting the maximum BIC value.

For the purpose of selecting the best configuration.

Claim 20

Elias, Magnuson and Katz do not teach the partition metric comprises determining a BIC value.

Straforini teaches the partition metric comprises determining a BIC value. (**Straforini,** C17:23-35; 'BIC value' of applicant is equivalent to 'bayes based configuration' of Straforini.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson and Katz by using the BIC value as taught by Straforini to have the partition metric comprised by determining a BIC value.

For the purpose of using Bayesian Information Criterion is used to determine which instrument configuration is the most optimal.

Elias and Magnuson do not teach an error value, and a compression ratio value for each partition.

Katz teaches an error value (**Katz,** C9:23 through C10:12; 'Error value' of applicant is equivalent to 'error bars' of Katz.), and a compression ratio value for each partition. (**Katz,** C2:44-56; 'Compression ratio' of applicant is equivalent to 'compression procedures' of Katz.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias and

Magnuson by disclosing an error value and a compression ration as taught by Katz to have an error value, and a compression ratio value for each partition.

For the purpose of generating values from partition metric for use in clustering methods.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias, Magnuson and Katz as set forth above in view of Huo. (U. S. Patent 6282305, referred to as **Huo**)

Claim 19

Elias, Magnuson and Katz do not teach the partition metric comprises determining a Minimum Description Length for each partition.

Huo teaches the partition metric comprises determining a Minimum Description Length for each partition. (**Huo,** C20:53-64; 'Minimum Description Length' of applicant is equivalent to 'minimum squared difference' of Huo.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Elias, Magnuson and Katz by finding the minimum length needed as taught by Huo to the partition metric comprises determining a Minimum Description Length for each partition.

For the purpose of finding the smallest portion needed for accurate results in lower percentage of extreme input measurements.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 21, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias, Magnuson, Katz and Straforini as set forth above, in view of Vaithyanathan. (U. S. Patent 5857179, referred to as **Vaithyanathan**)

Claim 21

Elias, Magnuson, Katz and Straforini do not teach the K-means clustering method is applied to determine a plurality of partitions.

Vaithyanathan teaches the K-means clustering method is applied to determine a plurality of partitions. (**Vaithyanathan,** C2:66 through C3:9) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson, Katz and Straforini by using k-means as taught by Vaithyanathan to have the K-means clustering method is applied to determine a plurality of partitions.

For the purpose of using an industry standard method of clustering data.

Claim 22

Elias, Magnuson, Katz and Straforini the hierarchical clustering method is used to determine the plurality of partitions.

Vaithyanathan teaches the hierarchical clustering method is used to determine the plurality of partitions. (**Vaithyanathan,** C8:12-23) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson, Katz and Straforini by using hierarchical clustering as taught by Vaithyanathan to have the hierarchical clustering method that is used to determine the plurality of partitions.

For the purpose of using an industry standard method of clustering data.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 24, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias, Magnuson and Katz as set forth above, in view of Vaithyanathan. (U. S. Patent 5857179, referred to as **Vaithyanathan**)

Claim 24

Elias, Magnuson and Katz do not teach selecting one of the determined plurality of partitions based on a partition metric comprises: determining, for each partition within the determined plurality of partitions, a centroid value for each group of pattern layer nodes within that partition.

Vaithyanathan teaches selecting one of the determined plurality of partitions based on a partition metric comprises: determining, for each partition within the determined plurality of partitions, a centroid value for each group of pattern layer nodes

within that partition. (**Vaithyanathan,** C10:22-42) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson and Katz by find the centroid value as taught by Vaithyanathan to select one of the determined plurality of partitions based on a partition metric comprises: determining, for each partition within the determined plurality of partitions, a centroid value for each group of pattern layer nodes within that partition.

For the purpose is so similar patterns can be merged and described by their centroid and weight.

Claim 25

Elias, Magnuson and Katz do not teach selecting one of the determined plurality of partitions based on a partition metric further comprises: determining, for each partition within the determined plurality of partitions, a covariance value for each group of pattern layer nodes within that partition.

Vaithyanathan teaches selecting one of the determined plurality of partitions based on a partition metric further comprises: determining, for each partition within the determined plurality of partitions, a covariance value for each group of pattern layer nodes within that partition. (**Vaithyanathan,** C6:50-67) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson and Katz by finding the covariance value as taught by Vaithyanathan to select one of the determined plurality of partitions based on a partition metric further comprises: determining, for each partition within the determined

plurality of partitions, a covariance value for each group of pattern layer nodes within that partition.

For the purpose of using an improved compression method may be employed wherein each pattern is described by its centroid, weight and covariance matrix.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elias, Magnuson Katz, Straforini and Vaithyanathan as set forth above, in view of Banavar. (U. S. Patent 6336119, referred to as **Banavar**)

Claim 23

Elias, Magnuson Katz, Straforini and Vaithyanathan do not teach the step of determining a plurality of partitions comprises applying the hierarchical clustering method to create partitions containing between about 1 and about 20 groups.

Banavar teaches the step of determining a plurality of partitions comprises applying the hierarchical clustering method to create partitions containing between about 1 and about 20 groups.(**Banavar,** abstract; 'Between about 1 and 20 groups' of applicant is equivalent to 'C clusters where C>1' of Banavar.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Elias, Magnuson Katz, Straforini and Vaithyanathan by keeping group size below 20 groups as taught by Banavar to have the step of determining a plurality of partitions comprises applying the hierarchical clustering method to create partitions containing between about 1 and about 20 groups.

For the purpose of balancing the compression versus loss of accuracy

Response to Arguments

5. Applicant's arguments filed on July 27, 2007 for claims 1-25, 31, 33, 37-39, 82-104 have been fully considered but are not persuasive.

6. In reference to the Applicant's argument:

Advisory_ Action of July 19, 2007
In an Advisory Action of July 19, 2007, the Examiner noted that the rejection based on 35 U.S.C. § 112 had been withdrawn. With respect to the rejection of claims under § 101, the Examiner seemed to indicate that the Specification did not support the phrase "medical condition" as required under § 112. Applicant submits that the phrase "medical condition" is fully supported by the specification. However, in order to advance

prosecution, Applicant has replaced the term "condition" with "event" in the claims. Applicant submits that while this amendment may change the scope of the claims, such amendment does not narrow the scope of the claims.

Examiner's response:

The Examiner notes the change from 'condition' to 'event.'

7. In reference to the Applicant's argument:

With respect to the rejections under § 102 and § 103, the Examiner did not enter Applicant's after-final amendments for consideration in the Advisory Action. Applicant notes that the present amendments to the claims differ from those that were not entered. Hence, Applicant now requests reconsideration and withdrawal of the outstanding rejections for the reasons set forth below. Rejections of Claims 1-25, 31-33, 37, 39, 82-85, 87-91, and 93-96 under 35 U.S.C. § 101

On page 3 of the Office Action, the Examiner rejected Claims 1-25, 31-33, 37, 39, 82-85, 87-91, and 93-96 under 35 U.S.C. § 101 as being drawn to nonstatutory subject matter. Applicant respectfully disagrees with these rejections for the reasons set forth below.

Applicant respectfully submits computer-related inventions are directed to patentable subject matter so long as the "claimed invention "transforms" an article or physical object to a different state or thing." See USPTO Interim Guidelines for Examination of Patent Applications (O.G. Notices, November 22, 2005). See, e.g., In re Lowry, 32 F.3d 1579, 1583~84, (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory). Applicant respectfully submits that each of Claims 1-25, 31, 33, 37, 39, 82-85, 87-91, and 93-96 recite such a transformation.

For example, Claim 1 recites a method comprising "collecting at least one training case in the medical instrument, wherein the training case has an input state indicative of at least a portion of a first biomedical signal of a particular patient and a corresponding output value indicative of a medical event of the particular patient," "receiving a second biomedical signal of the particular patient in the medical instrument," "identifying a medical event of the particular patient based the output of the neural network ," "applying the second biomedical signal to the reconfigured neural network to generate an output of the neural network," and "generating an output signal based on the

identified event. In other words, Claim 1 recites a method of transforming biomedical signals of a particular patient into output "data indicative of [an] identified medical event of the particular patient." Claims 89 and 99 recite systems that similarly transform biomedical signals. Similarly, Claim 31 recites a method that transforms input states and outputs "data indicative of the second output value indicative of a classification of a second input state." Thus, Applicant submits that independent Claims 1, 31, 89 and 99 do recite patentable subject matter. As each of Claims 2-25, 33, 37, 39, 83-85, 90, 91, 94-96 depend from one of Claims 1, 31, 89 and 99, Applicant submits that the dependent claims also are patentable for at least the same reasons.

Examiner's response:

The Examiner withdraws the 35 U.S.C. §101 rejection.

8. In reference to the Applicant's argument:

II.

Rejections of Claims 1, 2, 31-33, 37, 39, 82, 85, 87-89, 93, and 99 under 35 U.S.C. § 102 On pages 5-14 of the Office Action, the Examiner rejected Claims 1, 2, 31-33, 37, 39, 82, 85, 87-89, 93, and 99 as anticipated under 35 U.S.C. § 102 by the publication "Personal Computer System for ECG Recognition in Myocardial Infarction Diagnosing Based on an Artificial Neural Network," hereinafter referred to as "Elias." The rejections are discussed below. For the reasons set forth below, Applicant respectfully submits that Claims 1, 2, 31, 33, 37, 39, 82, 85, 87-89, 93, and 99, are patentable.

A. Brief Description of One Embodiment
One embodiment comprises a method and system in which training data that includes biomedical signal data associated with medical events of a particular patient is used to train a neural network that recognizes signal patterns of the particular patient associated with particular medical events in that particular patient. For example, the Specification recites:

In addition to being inefficient, applying this conventional process to the analysis of biomedical signals from a single patient is uneconomical. In order to combat the above problems, the systems and methods described herein provide an optimized neural network capable of learning, in real-time, patient states from biomedical signals, with a high degree of reliability.

Specification (as published), para. [0007] and [0008]. In particular, "in an embodiment used to detect medical events, users can customize a neural network to recognize

signal patterns that are specific to particular patient, or patterns characteristic of entirely new classes of events such as a research project investigating EEG signal patterns of previously uncharacterized medical states." Specification (as publication) paragraph [0009]. Thus, one embodiment "provides an optimized neural network capable of learning, in real-time, patient states from biomedical signals, with a high degree of reliability" that can "recognize signal patterns that are specific to particular patient." Specification (as published) paragraphs [0007]-[0009].

B.
Discussion of Rejection of Independent Claims 1, 82, 89, 93, and 99 under 35 u.s.c. The Examiner rejected Claims 1, 82, 89, 93, and 99 as being anticipated by Elias under 35 U.S.C. § 102. However, Applicant submits that Elias fails to teach at least "reconfiguring a neural network in the medical instrument based on at least one training case of the particular patient" as recited in Claim 1. Rather, Elias discloses creating a neural network based on a database that includes ECG "measurements plus patient age and sex [to] form an neural network input vector." Elias, 1095 at col. 1. "Neural Network is being entrained whit [sic] the data base mentioned above and once concluded the training process the whole system will be tested in a Medical Center in order to evaluate his (sic) performance." Elias at 1096. Elias continues that "It]he whole system will be tested in a medical center with signals token (sic) to confined patients." Elias, col. 2, lines 12-13. (Applicant notes that the Elias discloses testing on "patients," plural, and thus fails to teach training and testing on a singular patient as the Examiner suggested in the Advisory Action.) Further, Elias states that "[p]artial results have been obtained, although the neural network learning process has been concluded." Elias, col. 2, lines 4-5. Thus, Elias discloses training a network on a database of data, "concluding the learning process," and "test[ing] in a medical center." Id. (emphasis added). Nowhere does Elias teach or render obvious a method comprising "reconfiguring a neural network stored in the medical instrument based on at least one training case of the particular patient" and "applying the second biomedical signal [of the particular patient] to the reconfigured neural network to generate an output of the neural network" as recited in Claim 1. Accordingly, Applicant submits that Claim 1, as amended, is patentable.

Examiner's response:

Applicant makes the statement, 'Elias discloses testing on "patients," plural, and thus fails to teach training and testing on a singular patient.' Magnuson discloses neural networks being patient specific. (**Magnuson,** ¶0044, ¶0035, ¶0004, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Identified medical event' of applicant is equivalent to 'detecting such things such as

cancer or heart problems' of Magnuson.) Applicant takes the statement 'Elias teach or render obvious a method comprising "reconfiguring a neural network stored in the medical instrument based on at least one training case of the particular patient." Magnuson discloses reconfiguring a neural network by the ability to load a specific FMP i into the neural network. (**Magnuson,** ¶0044, ¶0035, Figure 8; 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM I)' on a 'non-linear model' of Magnuson.) Office Action stands.

9. In reference to the Applicant's argument:

> Similarly, Claim 82 recites "identifying a portion of the signal that is indicative of a medical event of the particular patient based on user input" and "reconfiguring a predictive model stored in a memory of an electronic device for identifying a subsequent medical event of the particular patient based on an additional biomedical signal of the patient." Claim 89 recites a system comprising a processor configured to "reconfigure the stored neural network based on the at least one training case of the particular patient." Claim 93 recites a system comprising a processing means configured to "reconfigure the stored neural network based on the at least one training case of the particular patient." Claim 99 recites "reconfiguring a neural network stored in the medical instrument based on the at least one training case of the particular patient." Applicant submits that Elias also fails to teach or render obvious these features for at least the same reasons discussed with reference to Claim 1. Accordingly, Applicant submits that each of Claims 1, 82, 89, and 99 are patentable in view of Elias.

Examiner's response:

The combination of Eilas and Magnuson disclose all elements of claim 82. 'Receiving a biomedical signal' of applicant is equivalent to 'q, r, s, p, t, age and sex' measurements of the patient of Elias. (**Elias,** abstract, p1096, C1:23 through C2:2)

'Identifying a portion' of applicant are given by the examples 'q, r, s, p, t, age and sex' measurements of the patient of Elias. (**Elias,** abstract, p1096, C1:23 through C2:2) 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM i)' on a 'non-linear model' of Magnuson. 'Particular patient' of applicant s equivalent to 'individual specifically' of Magnuson. 'Identified medical event' of applicant is equivalent to 'detecting such things such as cancer or heart problems' of Magnuson. (**Magnuson,** ¶0044, ¶0035, ¶0004, Figure 8) The storage of the predictive model in memory' of applicant is lustrated by each 'first principle model (FPM i)' on a 'non-linear model' of Magnuson. (**Magnuson,** ¶0044, ¶0035, Figure 8) Office Action stands.

10. In reference to the Applicant's argument:

C.
Discussion of Rejection of Independent Claim 31
On page 7 of the Office Action, the Examiner rejected Claim 31 as being anticipated by Elias. The Examiner argued that Elias discloses "reconfiguring the neural network to correctly classify the first training case without retraining the neural network" because Elias teaches reconfiguring the neural network by adjusting the weight of each node.

However, Applicant notes that the Specification recites that "'Retraining' as used herein refers generally to any process for incorporating new training cases into a classification system that requires nontrivial computation. Within the context of a MLP (multilayer perceptron), "retraining" specifically refers to the iterative propagation process referred to above." Specification (as published) paragraph [0033]. "As is known to persons of ordinary skill in the art, MLP training consists of numerous iterations of propagation algorithms through all of the training cases, requiring high amounts of processing time.

MLP's do not support incremental learning, meaning training on new training cases but not old, because the link weights in an MLP are updated a very small amount in each iteration." Id.

However, nowhere does Elias disclose any type of retraining. Rather, as noted above, Elias merely discloses that a "Neural Network is being entrained whit [sic] the data base mentioned above and once concluded the training process the whole system will be tested in a Medical Center in order to evaluate his (sic) performance." Elias at 1096. In particular, Elias discloses using a MLP such as "a three layer backpropagation neural network" for which retraining would include the very "iterative propogation" that the Specification refers to as "retraining." Elias 1096. Accordingly, Applicant submits that Elias fails to teach or render obvious "reconfiguring the neural network to correctly classify the first training case without retraining the neural network" as recited by Claim 31. Moreover, Claim 31, as amended, recites that "reconfiguring the detection module further comprises adding a first pattern layer node to the neural network based on the first training case." Applicant respectfully submits that not only does Elias fail to disclose reconfiguring in general, it also fails to teach or suggest that "reconfiguring the detection module further comprises adding a first pattern layer node to the neural network based on the first training case" as recited by Claim 3i, as amended. Accordingly, Applicant submits that Claim 31 is patentable over Elias.

As each of Claims 2, 33, 37, 39, 85, 87, and 88 depends from one of Claims 1, 31, 82, 89, 93, or 99, the Applicant submits that each of those claims is patentable for at least the same reasons discussed above with reference to Claims 1, 31, 82, 89, 93, and 99.

Examiner's response:

Applicant makes the statement 'Elias fails to teach or render obvious reconfiguring the neural network to correctly classify the first training case without retraining the neural network' Magnuson discloses 'Particular patient' of applicant is equivalent to 'individual specifically' of Magnuson. 'Reconfiguring a neural network' of applicant is equivalent to 'first principle model (FPM I)' on a 'non-linear model' of Magnuson. 'Adding a first pattern layer' of applicant is equivalent to inserting one of the 'first pattern model (FPM i)' of Magnuson. (**Magnuson,** ¶0044, ¶0035, Figure 8) Office Action stands.

11. In reference to the Applicant's argument:

III.
Rejections of Claims 3.-..2. 5., 3.8, 83, 84, 90-92, and 94-98 under 35 U.S.C. § 103(a)
On pages 14-36 of the Office Action, the Examiner rejected Claims 3-25, 38, 83, 84, 90-92, and 94-98 under 35 U.S.C. § t03(a) as being rendered obvious by Elias in combination with other references. However, each of Claims 3-25, 38, 83, 84, 90-92, and 94-98 depends from one of Claims 1, 31, 82, 89, or 93, the Applicant submits that each of those claims is patentable for at least the same reasons discussed above with reference to Claims 1, 31, 82, 89, and 99.

Examiner's response:

All issues concerning the amended independent claims have been addressed.

Office Action stands.

12. In reference to the Applicant's argument:

IV.
Discussion of Claim 86
On page 2 of the Office Action, the Examiner objected to Claim 86 as depending on rejected Claim 82. In the Advisory Action, the Examiner indicated that Claim 86 was rejected. As discussed above, Applicant submits above that Claim 82 is patentable. Hence, Applicant respectfully submits that Claim 86 is allowable in its current form.

Examiner's response:

Claim 86 was missed by the Examiner in the previous office action, but was addresses with the reference of Jordan in this office action. Office Action stands.

Examination Considerations

13. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has the full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

14. Examiner's Notes are provided to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and sprit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but link to prior art that one of ordinary skill in the art would find inherently appropriate.

15. Examiner's Opinion: Paragraphs 13 and 14 apply. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Conclusion

16. The prior art of record and not relied upon is considered pertinent to the applicant's disclosure.

-U. S. Patent 5751913: Chiueh

-U. S. Patent 5546503: Abe

-U. S. Patent 5533169: Burnod

-'A reconfigurable VLSI neural network': Satyanarayana, S

17. Claims 1-25, 31, 33, 37-39, 82-104 are rejected.

Correspondence Information

18. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner Peter Coughlan, whose telephone number is (571) 272-5990. The Examiner can be reached on Monday through Friday from 7:15 a.m. to 3:45 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor David Vincent can be reached at (571) 272-3080. Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

Hand delivered to:

Receptionist,

Customer Service Window,

Randolph Building,

401 Dulany Street,

Alexandria, Virginia 22313,

(located on the first floor of the south side of the Randolph Building);

or faxed to:

(571) 272-3150 (for formal communications intended for entry.)

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have any questions on access to Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Peter Coughlan

9/29/2007

JOSEPH P HIRL
PRIMARY EXAMINER
TECHNOLOGY CENTER 2100